Amendments to the Specification

Please replace the paragraph beginning at Page 5, line 3 with the following amended paragraph:

This is accomplished by employment of a photoelectrode assembly in which the photo electro-catalysts are deposited onto a proton exchange membrane, such as NAFION®, a perfluorosulfonic acid polymer available from DuPont. In this application, the proton exchange membrane performs a multitude of functions including gas separation, water containment, proton exchanger and water transporter. The ionomer of the proton exchange membrane in the catalyst layer acts as a capillary channel to transport water to the catalyst surface and as an electron conductor to transport electrons between the two photoelectrodes. In addition, this fully hydrophilic ionomer helps to distribute water to the catalyst surface without blocking the incoming solar energy.

Please replace the paragraph beginning at Page 7, line 10 with the following amended paragraph:

Fig. 2 shows a photoelectrolysis cell 20 in accordance with one embodiment of this invention, which cell comprises a transparent enclosure 21, preferably constructed of glass or ~~plexiglas~~ PLEXIGLAS® (a transparent acrylic

material), a photoanode 23, a photocathode 22 and an electrolyte 28 in the form of a dilute H_2SO_4 water solution disposed there between. Photocathode 22 comprises a proton exchange membrane 25 in contact with the electrolyte 28 and a semiconductor catalytic layer 24 disposed on the surface of proton exchange membrane 25 facing away from electrolyte 28 and in the direction of transparent enclosure 21. Similarly, photoanode 23 comprises a proton exchange membrane 27 in contact with electrolyte 28 and a semiconductor catalytic layer 26 disposed on the surface of proton exchange membrane 27 facing away from electrolyte 28 and in the direction of transparent enclosure 21. As will be appreciated from consideration of the invention as shown in Fig. 2, there is no electrolyte disposed in the space between photoanode 23, photocathode 22 and transparent enclosure 21. As a result, the only solar energy loss encountered by the sunlight ~~28~~ 14 as it shines on the photoelectrodes is due to the transparent enclosure wall of transparent enclosure 21. In operation, the electrolyte water is distributed from the side of the semiconductor catalytic layers 24, 26 facing the electrolyte 28 (the backside of the semiconductor catalytic layers) and transported to the catalyst layer by an ionomer coated on the catalyst surface. The products from the photoelectrolysis, hydrogen and oxygen, can, thus, leave the surfaces of the photoelectrodes without any restrictions from liquid water. Proton transfer from the photocathode to the photoanode is effected by the proton exchange membranes 25,

27. Thus, the proton exchange membrane 25, 27 functions as a gas separator, water container, proton exchanger, and water transporter.

Please replace the paragraph beginning at Page 9, line 14 with the following amended paragraph:

Although particularly suitable for use in connection with water-splitting to produce hydrogen and oxygen, the photoelectrode of this invention is also suitable for use in connection with photovoltaic applications for the generation of electricity. Fig. 3 shows a photoelectrochemical photovoltaic cell 39 in accordance with one embodiment of this invention, which cell comprises a housing 38 having a transparent wall 36 through which sunlight ~~28~~ 14 is able to pass into the cell. Disposed within housing 38 is at least one semiconductor photoelectrode 35 comprising proton exchange membrane 27 having one side facing, and in contact with, a redox electrolyte 37 contained within housing 38 and comprising a semiconductor catalytic layer 26 disposed on, and in contact with, the opposite side of proton exchange membrane 27. Semiconductor photoelectrode 35 is oriented within housing 38 such that sunlight ~~28~~ 14 passing through transparent wall 36 strikes semiconductor catalytic layer 26. In addition, proton exchange membrane 27 acts as a barrier, which prevents the redox electrolyte 37 from flowing into the space between transparent wall 36 and

semiconductor photoelectrode 35, as a result of which the only substantial solar energy loss occurs in the passage of the sunlight through transparent wall 36. Disposed within redox electrolyte 37 is a second electrode 29, which is not a photoelectrode, but rather is a conventional electrode, which is not exposed to the sunlight, or at least is not energized in the presence of sunlight. In the embodiment shown in Fig. 3, the oxidation reaction occurs at semiconductor photoelectrode 35 and the reduction reaction occurs at the second electrode 29, resulting in the flow of electrons.

Please replace the paragraph beginning at Page 10, line 15 with the following amended paragraph:

Fig. 4 is a diagram of a photoelectrode assembly <u>30</u> suitable for use in the system of this invention. The photoelectrode assembly comprises photoelectrode 33, proton exchange membrane 31, a carbon electrode 32 for transfer of current and a metal strip 34 for connecting the photoelectrode assembly to another photoelectrode.